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Is the super-Penrose process possible near black holes?

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Abstract

© 2016 American Physical Society. We consider collisions of particles near generic axially symmetric extremal black holes. We examine the possibility of an indefinitely large extraction of energy (the so-called super-Penrose process) in the limit when the point of collision approaches the horizon. Three potential options are considered: fractional powers of the lapse function in the relations between the energies and the angular momenta of particles at the point of collision, collision between outgoing and ingoing particles, and collision in the ergoregion far from the horizon. It turns out in all three cases that states suitable for the super-Penrose process cannot be obtained from the previous collision of particles with finite masses and angular momenta.

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